

**Before the**  
**FEDERAL COMMUNICATIONS COMMISSION**

**May 16, 2012**

In the Matter of:	)	
	)	
Commission Seeks Comment on Impediments to	)	<b>GN Docket No. 12-91</b>
Amateur Radio Emergency Communications	)	
	)	

**Comments in response to Impediments to**  
**Emergency Communications through Amateur Radio**  
  
**By**  
  
**Steve Waterman, K4CJX**

***1. BACKGROUND AND INTRODUCTION:***

I, Steve Waterman, have been a licensed Radio Amateur since 1955, holding the Amateur radio call, K4CJX, I am a Delta Division Assistant Director of the American Radio Relay League, hereafter referred to as the “ARRL,” and a member of its Amateur Radio Emergency Service. I am fully active with Emergency Communications in Amateur radio as well as in the Public Safety services. I am a member of the FEMA Region 4 Emergency Communications Coordination Working Group (RECCWG), the Tennessee DHS District 5 (former UASI) Communications Committee, a Tennessee Emergency Management Agency volunteer as a Communications Unit Leader (COML), and active with civil government and non-government agencies at all levels, CONUS-wide through the Department of Defense MARS program via DODI 4650.02 as the Army Military Auxiliary Radio System National Automation Coordinator and Agency Liaison for participating civil agencies at all levels.

Professionally, from 1979 until 1999, I worked in the telecommunications software industry as both Vice President of an unregulated subsidiary of a Regional Bell Operating Company, and with an independent telecommunications software and consulting company, where I served a portion of my time as Vice President of Software Development and as a Vice President of Telecommunications Data Network Design, among other duties, including providing consultation, and end-user network design software to the Military, State and Federal Governments, and Fortune 500 companies. Although, I have had many interests during my tenure in the Amateur radio service, for approximately 20 years, I have been directly involved with Amateur radio and its growth of digital communications from the early days of “RTTY Auto-Start” to today, where I serve as a member of the Winlink 2000 development team as its Network Administrator. With this experience, I consider myself qualified to provide information that would vastly enhance the ability of the Amateur Radio Service to provide Emergency Communications. However, and although obviously important, I will leave the issue of antenna restrictions to those who are more familiar with those issues.

## ***2. DISCUSSION OF IMPEDIMENTS AFFECTING AMATEUR RADIO EMERGENCY COMMUNICATIONS.***

The Amateur Radio Services is extremely diversified, and only in the last 5 years has emergency communications (EmComm) been deemed as a priority, not only for Amateur Radio, but also to every concerned citizen in the US. This was spawned by the September 11 NYC Twin Tower destruction, and by several major natural casualty events including major hurricanes, tornados, tsunamis and earthquakes. Now with the National Incident Management System (NIMS) process, which details the Incident command process, Amateur radio should and could be included as an important component in providing contingency communications for initial response, and where local infrastructure remains inoperative, Amateur Radio could also readily provide adequate initial Health and Welfare communications to all involved. In today's EmComm world, independent actions are not encouraged. The National Incident Management System has provided us all with an excellent format for providing

emergency response and recovery. No longer is it desirable to single handedly attempt to engage the various component pieces that comprise a successful response and recovery from any casualty event. This is also true of Amateur Radio volunteers and the agencies that will involve them when needed. Building relationships with those professionals who lead Incident Commands, and educating volunteers to the NIMS process is essential to any successful emergency communications effort by auxiliary volunteers, including Amateur radio. Fact is, it is mandatory.

**Education** is a critical issue that dominates the ability for Amateur Radio, or any other communications sector, to provide adequate emergency response and recovery communications as a contingency for Public Safety and other normal means of communications. Historically, such cases involve Amateur Radio contingency communications when normal local and nearby communications infrastructure has been damaged, overloaded, or is otherwise not available. However, unlike the individual “heroics” of the past, especially with domestic (CONUS) casualty events, Amateur Radio operators required no or little education in the methodologies and processes of emergency communications. Today, however, those processes are now formally defined through the National Incident Management System and *must be understood and followed* in order to efficiently and successfully implement communications in an Incident Command.

Most recently, the Department of Homeland Security’s FEMA and OEC organizations have funded and provided classroom courses such as ICS-300, ICS-400, COML, and AUXCOM (specifically designed for the Amateur radio volunteer) for auxiliary communications personnel. For those Amateur Radio operators who have taken the initiative to be sponsored by a civil agency, these courses and the relationships they produce through course teamwork with actual agency personnel, have completely transformed the ability for the auxiliary volunteer to not only understand how the Incident Command System works, but also gives these volunteers an opportunity to build relationships with professional Public Safety personnel, and successfully train with them in realistic exercises. In other words, when completed, these educational experiences and exposures provide the tools and skills necessary to understand, and then assist, those who

are in charge of the Incident Command process. Attempting to provide any type of Emergency Communications outside a formal incident command in today's Public Safety environment, is not only a hindrance to professional response and recovery, but it is ineffective as well.

The major impediment with this process is that there is no formal process to promote and attract these auxiliary communications volunteers. The ARRL does what it can to enlighten their membership, and is in the process of changing their Amateur Radio Emergency Communications Service, but they do need assistance in bridging the gap between the ESF2 professional, and the Amateur volunteer operator. Accelerating the process of promoting what the government now offers through the FEMA Technical Assistance Catalog, such as the Auxiliary Communications classroom course, and the Communications Leadership courses, not only to the Amateur radio volunteer, but also to the sponsoring agencies, will definitely enhance the value of funds now being provided to agencies for the purpose of educating their own employees and auxiliary volunteers.

**FCC Part 97 Restrictions that impede the trained Amateur radio operator from effective Emergency Communications operations.**

Although the *FCC Part 97.1 a)* suggests *"Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications,"* there are several impediments that continue to keep Amateur Radio from being effective contingency communications for EmComm. This is true not only for Emergency Communications, but just as important, they impede the ability of the Amateur Radio Service from moving forward in the advancement of the radio art.

Specifically, there are three examples of such impediments, that when removed, would greatly enhance the capabilities for the delivery of emergency communications for the Amateur Radio Service. All three are found in the FCC Part 97 rules. Volunteers and agencies they serve have found that the following Part 97 restrictions have a

profound effect on the ability of the Amateur Radio emergency communications volunteer to provide effective contingency communications.

**FCC Part 97.113(i).** This ruling was recently changed to allow the following, *"(i) A station licensee or control station operator may participate on behalf of an employer in an emergency preparedness or disaster readiness test or drill, limited to the duration and scope of such test or drill, and operational testing immediately prior to such test or drill. Tests or drills that are not government-sponsored are limited to a total time of one hour per week; except that no more than twice in any calendar year, they may be conducted for a period not to exceed 72 hours."*

In today's National Incident Management (NIMS) environment, structured Incident Commands are set up to provide communications support for all civil casualty events, and have proved to be an effective means by which all support services deal with such civil emergencies. The days of independently and heroically managing any emergency communications outside the NIMS ICS framework are gone. Thus, all communications during such incidents set up to handle emergency communications for all levels of casualty events are placed within the NIMS ICS structure, including Amateur Radio volunteer communications support (in ESF-2). In accordance with the National Incident Management System guidelines and formal training, non-government partners are critical to the emergency response and recovery process. Fact is, the National Response Framework guidelines specifically refer to the importance of non-government organizations and corporations as the most valuable asset available for EmComm. Why then is it prejudiced in the FCC Part 97? DHS tiered corporations are just as relevant as government agencies, and without their assistance, the incident command system process would be inadequate. The Amateur volunteer is not adequately prepared with proper credentials to serve the Federal Agencies. Besides, Federal agencies are not first responders. There are Federal laws and mandates written that prevent such volunteer assistance with TSA, the FBI, FEMA and other such organizations. Volunteers may be involved in training, and exercises, but actual Federal agency deployments do not usually include Amateur Radio since they are not involved in first response communications as

are non-government organizations. However, first responders from the states, counties, local governments and non-government organizations and corporations, whose personnel contain Amateur operators, are *still* held at bay.

Because many of the professional responders of involved first response agencies in such incidents are also Amateur Radio operators, restricting communications support services with the language found in 97.113(i) is not viewed as productive by these individuals, nor is does it promote a friendly environment for the use of auxiliary volunteer communicators. Being closely involved with civil government and non-government organizations, I can report that the recent change from *not* allowing *any* use of Amateur radio by paid employees of responding agencies with Amateur licenses, to the current status was viewed as only "political" and not as a realistic or popular, and useful approach for those involved in Public Safety communications, and makes it very difficult for those involved as COMLs (ICS communications unit leaders) to fully utilize Amateur Radio volunteers, or utilize the service themselves as Amateur employees of involved agencies, to assist with exercises or real-life actual events. To make my case, please just review the politics of the recent change in Part 97.113(i) .

**2. FCC Part 97.113(a)(4)** *"messages in codes or ciphers intended to obscure the meaning thereof, except as otherwise provided herein."* For emergency communications or any contingency communications dealing with secure or sensitive material, elimination or alteration of this ruling should be obvious. The use of PGP, NSA and Fed-Std AES encryption is widespread and legally required (HIPAA, etc.). Those determining the effectiveness of Amateur Radio as a contingency option for EmComm must take this restriction seriously, and make some adjustments to it. In order to use such methodologies successfully, exercising these options is the only real way to train to use them. Thus, for emergency communications exercises, and in real-life situations, such encrypted techniques must be understood and practiced to be used effectively. Allowing encryption techniques *only* during an emergency will result in incorrect procedures and many errors. "We must fight as we train and train as we fight." Familiarity is mandatory for successful implementation. This is *not* to suggest that encryption be a standard in

Amateur Radio, but provisions to activate it for training and actual use should be incorporated into Part 97.113(a)(4). How else can such communications be carried over Amateur Radio data pathways? After all, in spite of the restrictive rulings in Part 97.221 and 97.309(f)(3), Amateur Radio possesses some of the fastest and most robust ARQ protocols in today's HF data communications arena, including our own Government's STANAG data protocols.

**3. FCC Part 97.221.** This area is critical to the success to any emergency communications support effort on behalf of Amateur radio. Most Public Safety communications are voice communications-related. When local and regional Public Safety communications are damaged or otherwise not available, it has a profound impact on the response and recovery efforts for any existing or potential disaster. This is where voice-related Amateur Radio may play an important role with its complementary VHF/UHF "last mile" communications, and when required, its HF long-haul Single Sideband (SSB) voice communications. Regardless, voice communications are the most robust communications in Public Safety and are also duplicated in most communities through Amateur Radio.

However, Public Safety has sparse internal means of sending complex messages that contain accurate data, which cannot readily be handled by voice operations. They mostly depend on normal external communications media to communicate data that is not practical to send via voice. In major disasters, and even those that are local in nature, normal data communications can be easily disrupted by traffic volume, physical damage and by many other means, leaving the responding agencies without anything but voice operations. Satellite data transmissions also have their issues and recent historical records show the vulnerability of such communications.

Thus, in casualty zones where the communications infrastructure for data communications are critical, smart phones, computer air cards, other WIFI, satellite and other means of carrying complex messages, may also be stricken as a result of an immediate disaster. When such data communications media is not in place, the

transmission of important and accurate data cannot be performed. Communications of shelter inventories such as medical supplies, information under HIPAA compliance, prescriptions, food, bedding and other such communications are not available, as well as the communications instructions for repair of infrastructure, disaster assessment photographs and other complex messages.

Amateur Radio has the capability to send such information by radio only, as well as the more important capability of reaching the Internet outside the casualty zones *by bridging broken Internet links with radio links*. Thus, with digital data modes, Amateur radio allows involved agencies and other responders access to complex messages, both to each other inside casualty zones or to anyone anywhere outside the damaged zones. Because of the restrictive spectrum, which allows higher speed data communications, any volume of such data transmissions will be futile because they are all crowded into an exceptionally small area within the Amateur Spectrum. A voice signal is approximately 2.6 KHz. Higher speed data transmissions that utilize real "ARQ" error correction between the transmitting and receiving stations require at least 2.4 KHz bandwidth. On most of the HF Amateur spectrum, there is only from 5 KHz to approximately 15 KHz allowable space for such transmissions, unless there is a control operator on both ends of the transmission. That would be similar to asking our Internet email ISPs to have a live human being on each and every MAIL server used. Such conditions are not only impractical, but impossible. Modern manufacturers realize this, and thus, only a handful of manufacturers provide radio modems that provide adequate data transmission modes. Fact is, even our own US Government STANAG data protocols are not allowed on the Amateur bands for this, and other reasons listed below in Part 97.307 f. 3.

Regardless of any other consideration, for effective communications of complex messaging, Part 97.221 must be either severely expanded in frequency allowance or eliminated completely. Moving to additional areas *only* during an emergency is not workable due to the nature of the networks, which provide these capabilities. That would be analogous to requiring a Common Carrier or ISP to change its domain name only during an emergency. Such actions would cause nothing but confusion and errors.



In order for Amateur Radio to be an effective and accurate bridge to Internet email and radio-to-radio messaging containing binary attachments such as spreadsheets, word processing documents, photographs, and other such complex message components, the ruling in 97.221 must be changed.

**FCC Part 97.309 f. (3)** *"Only a RTTY or data emission using a specified digital code listed in §97.309(a) of this part may be transmitted. The symbol rate must not exceed 300 bauds, or for frequency-shift keying, the frequency shift between mark and space must not exceed 1 kHz."* This is not an easy subject to convey. Essentially, it was placed into Part 97 to contain the bandwidth and location of older digital modes that are no longer in favor. The more modern modes do not respond to the notion that the "symbol rate" in symbols per second is directly related to bandwidth. Today, with the more modern data modes, including our own government's standards, enabling technologies are capable of much more accurate and reliable transmissions using much less bandwidth. When Part 97.309 f. (3) was written, I was involved in the process of proper wording, and I can assure that the Modes used today were not even imagined when this rule was written.

Perhaps a few popular examples of many would be in order:

MODE	SYMBOL RATE	BANDWIDTH	SPEED	LEGAL
Pactor 1	200 baud	450 Hz	200 bps max	YES
Pactor 2	100 baud	450 Hz	800 bps	YES
Pactor 3	100 baud	2400 Hz	3600 bps max	YES
Pactor 4	1800 baud	2400 Hz	5800 bps max	NO
US gov't	2400 baud	2400-3000Hz	2400-9600 max	NO

As illustrated above, the first two data transmission modes are legal modes. However, notice that the Pactor 4 mode, which exceeds the 300 "baud" allowable symbol rate, is the exact same bandwidth of the legally accepted Pactor 3 mode. Notice also that the first

mode, Pactor 1, has a symbol rate of twice that contained in Pactor 3, but only a small portion of the bandwidth and a speed that is impractical for use in real-life emergency communications. Pactor 2 has the same bandwidth, but half the symbol rate, with much better speed characteristics. *Notice* that none of these protocols are any wider than a normal SSB voice signal on the Amateur Spectrum. Fact is, most are more contained. Also note that these are fully error correcting ARQ protocols, which provide either 100 percent accuracy or none.

Elimination of this *antiquated* rule is a necessity if Amateur Radio is to perform optimally to assist Public Safety and others in providing communications for complex messaging. Again, this rule keeps the Amateurs from using their own country's standard protocols as well as discouraging the manufacturing of more robust data protocols. Perhaps the FCC will consider directly limiting the bandwidth of digital transmissions rather than the present incorrect and antiquated symbol rate, which definitely impedes advancement and reliability of transmissions.

In sum, changes are necessary for Amateur Radio to be an effective contingency communications system option for the safety and well-being of those it will assist.

Respectfully Submitted,

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